患の調整後に，BMI 18.5未満のグループで入院および生命予後悪化のリスクが高くなることが示されている[10]．また，このコホート研究において，BMIのカットオフ値を22として同様の検討をした結果においても，BMI 18.5のカットオフ値の検討と同様の結果が得られ（未発表データ），高齢者における体重変動を把握しておくことは必須であるが，極度の肥満でなければ厳格に適正体重へと管理させることは，むしろ生命予後の悪化につながる可能性があることを表している．

一方，在宅の要介護高齢者では，極度の亀背や筋肉，関節の拘縮のために身長が測定できなかったり，ADLに障害があるため体重の測定に困難を要する患者も多く存在する．その場合は，日本人の新身体計測値（Japanese Anthropometric Reference Data 2001；JARD 2001）[11]の示す上腕と下腿を測定し，JARD 2001に示された標準値との比較から評価する方法をとる．立位または座位で利き腕以外の腕の上腕周囲長（AC），上腕三頭筋皮下脂肪厚（TSF）の測定から，計算式により上腕筋囲（AMC），上腕筋面積（AMA）を求める．下腿周囲長（CC）は，利き足ではない下肢の最も太い部分の周囲を測定する．AMA，AMC，CCは骨格筋量を表し，TSFは皮下脂肪量を表す．表2にJARD 2001の示す性別ごとの65歳以上の平均値と標準偏差，中央値

表2 JARD 2001：年齢別の身体計測値（65歳以上抜粋）（文献11）

	年齢（歳）	男性		女性	
		平均±標準偏差	中央値	平均±標準偏差	中央値
body mass index（BMI）	65～69	21.8±2.5	22.1	22.5±3.4	21.9
	70～74	21.9±3.3	22.0	21.8±3.7	21.4
	75～79	21.0±3.2	21.2	21.5±3.7	21.2
	80～84	20.9±3.4	20.6	20.5±4.3	20.1
	85以上	20.7±3.8	20.2	20.2±3.5	20.5
上腕周囲長（cm）	65～69	27.3±2.7	27.5	26.4±2.7	26.2
	70～74	26.7±2.9	26.8	25.6±3.2	25.6
	75～79	25.8±3.0	26.2	24.6±3.5	24.8
	80～84	25.0±3.0	25.0	23.9±3.3	24.0
	85以上	23.9±3.1	24.0	22.9±3.4	22.6
上腕三頭筋皮下脂肪厚（mm）	65～69	10.6±4.2	10.0	19.7±6.9	20.00
	70～74	10.8±5.3	10.0	17.1±6.8	16.00
	75～79	10.2±4.2	9.3	14.4±6.8	14.00
	80～84	10.3±4.3	10.0	13.0±5.9	12.50
	85以上	9.4±4.6	8.0	11.7±5.9	10.00
上腕筋面積（cm^2）	65～69	23.9±2.6	24.0	20.1±2.3	20.1
	70～74	23.3±2.7	23.6	20.2±2.7	20.3
	75～79	22.6±2.7	22.9	20.1±2.7	20.2
	80～84	21.7±2.8	21.8	19.8±2.5	20.0
	85以上	20.9±2.7	21.4	19.2±2.7	19.3
下腿周囲長（cm）	65～69	33.9±3.1	34.0	32.4±2.9	35.2
	70～74	33.1±3.0	33.4	31.6±3.1	31.6
	75～79	32.8±3.2	32.8	30.6±3.2	30.6
	80～84	31.9±3.5	31.9	29.2±3.6	29.6
	85以上	30.2±3.5	30.0	28.1±3.5	28.3

を示した．これらの指標を使った要介護高齢者を対象としたコホート研究で，性別，年齢，ADL，糖尿病を含む慢性疾患などの共変量で調整後に，TSFとAMAの値が低いことは，生命予後悪化のリスクとなることを報告している[12]．したがって，身体計測指標が標準値よりも20％以上下回っている場合には，栄養不良のリスクがあると考えて注意が必要である．

血液生化学指標には，血清総蛋白質や血清アルブミン値などが用いられ，血清総蛋白質6 g/dl未満，血清アルブミン値3.5 g/dl未満をそれぞれ栄養障害ありとする．しかし，C反応性蛋白質（CRP）が5 mg/dl以上である炎症状態では，アルブミン値が炎症症状に左右されている可能性が高いため，その判定は慎重に行う必要がある．

包括的高齢者機能評価（CGA）

高齢糖尿病患者では，身体機能，認知機能，well-beingが低下している頻度が高く，この機能低下は，非糖尿病患者と比較して糖尿病患者で2～3倍多い．包括的高齢者機能評価（CGA）は，高齢患者の日常機能を包括的に評価し，そのQOL改善のための種々の手段を講ずるために行うものである．ここから得られる情報は，これから食事療法の方法を検討するために非常に貴重な情報となる．CGAは大きく分けると身体的（physical，functional），精神心理的（mental），社会的（social economic）の3部門からなり，糖尿病治療で必要なCGAの項目は表3に示すとおりである．

身体機能評価としての基本的ADLは，日常生活での自立の程度を評価し，さらに高度な生活機能を評価する手段的ADLが使われている．これらの評価は身体活動量の目安になる．

精神・心理的機能はとくに，認知機能，せん妄，うつ状態の把握を行う．認知機能障害や抑うつの存在は，高齢者の生命予後，日常生活，健康状態に影響を及ぼすが，高齢者では日常診療で見逃されやすく，スクリーニングとして評価するべきである．在宅の要介護高齢者の「うつ」発症頻度を検討した報告で，GDS-15スコア6点以上を「うつ」としたところ，50％以上がうつと判定されたことを示している．また，この検討において，うつと栄養状態不良との関連も認められている[6]．認知機能の評価は，改訂長谷川式簡易知能検査，Mini-Mental State Examination（MMSE）で評価する．MMSEでは23点以下，改訂長谷川式簡易知能検査では20点以下で認知症の疑いがあると判定する．糖尿病患者は非糖尿病患者と比べて約1.5～4倍認知症になりやすく，血管性認知症のみならずアルツハイマー病のリスクとなっている[13]．また，高齢糖尿病患者1139名を5年間追跡した研究において，HbA1c（NGSP値）が7％以上の人は，HbA1cが低い群と比べて認知症を起こす頻度が多いことを報告している[14]．ともに有病率がきわめて高い疾患であることから，認知症と糖尿病を併せ持つ患者は多く存在することが予測される．

その他，嚥下機能に問題がある高齢者は多い．このような高齢者は十分に経口摂取できないために，低栄養状態に陥りやすい．食事中の頻回のむせや水分摂取の際のむせなどがある場合は，誤嚥性肺炎のリスクがあることを疑い，嚥下機能評価を行うことが望ましい．

表3　糖尿病における包括的高齢者機能評価

分類	評価項目	評価内容	主なスケール
身体機能	基本的ADL	食事摂取，更衣，移動，排泄，整容，入浴などの生活を営むために不可欠な基本的動作能力を評価	Barthel Index，Functional Independence Measurement（FIM）
	手段的ADL	家事，買物，電話など介護者のいない生活を想定した場合，欠かすことのできない生活能力を評価	Lawtonらによる評価法
精神・心理的機能	認知機能	記銘力，想起の力，失語，失行，失認などの障害の有無を評価	改訂長谷川式簡易知能評価スケール（HDS-R），Mini-Mental State Examination（MMSE）
	抑うつ	スクリーニングと問診後に重症度を判定	Geriatric Depression Scale（GDS）-15
社会的状態	対象患者の経済状態，家族状況（配偶者の有無），コミュニケーションの有無		

高齢糖尿病患者の食事療法の実際

栄養素摂取量

糖尿病の食事療法の基本方針としては，身長(m)^2×22で求めた理想体重に1 kgあたり25～30 kcalを掛けて指示エネルギーを設定するのが一般的であり，成人同様に各栄養素をバランスよく摂取することが重要である．

糖尿病食事療法の指導の多くは，日本糖尿病学会が編集している，個々の患者に1日の必要エネルギーを算定できるように編集された『糖尿病食事療法のための食品交換表』[15]を使う．しかし高齢糖尿病患者は，患者自身の認知機能が低下している場合や，介護者が高齢で要介護状態である場合も少なくない．したがって，シンプルに1日の摂取量がわかるようなツールを示すことが望ましい．

一方，エネルギー量の決定に参考となるのが，厚生労働省による『日本人の食事摂取基準（2010年度版）』[16]記載の基礎代謝量（表4）と，身体活動レベル別の推定エネルギー必要量（表5）である．70歳以上をみると，基礎代謝量は男性1280 kcal/日，女性1010 kcal/日で，身体活動レベルⅠでは男性が1850 kcal/日，女性が1450 kcal/日となっており，これらが標準的な高齢者のエネルギー必要量である．各栄養素の摂取基準は表6を参照していただきたい．しかし，これらの表の栄養素を示すだけでは，高齢者だけではなく成人においても，なにをどれだけ食べたらよいのか一般的に理解しにくいものである．表7に，この『日本人の食事摂取基準（2010年度版）』の推定エネルギー必要量に準拠した食品構成を示す[17]．この表には，各食品群を1日に

表4 基礎代謝量（文献16）

性別	男性			女性		
年齢（歳）	基礎代謝基準値（kcal/kg体重/日）	基準体重（kg）	基礎代謝量（kcal/日）	基礎代謝基準値（kcal/kg体重/日）	基準体重（kg）	基礎代謝量（kcal/日）
1～2	61.0	11.7	710	59.7	11.0	660
3～5	54.8	16.2	890	52.2	16.2	850
6～7	44.3	22.0	980	41.9	22.0	920
8～9	40.8	27.5	1120	38.3	27.2	1040
10～11	37.4	35.5	1330	34.8	34.5	1200
12～14	31.0	48.0	1490	29.6	46.0	1360
15～17	27.0	58.4	1580	25.3	50.6	1280
18～29	24.0	63.0	1510	22.1	50.6	1120
30～49	22.3	68.5	1530	21.7	53.0	1150
50～69	21.5	65.0	1400	20.7	53.6	1110
70以上	21.5	59.7	1280	20.7	49.0	1010

表5 高齢者（70歳以上）の推定エネルギー必要量

	男性			女性		
身体活動レベル*	Ⅰ	Ⅱ	Ⅲ	Ⅰ	Ⅱ	Ⅲ
エネルギー（kcal/日）	1850	2200	2500	1450	1700	2200

表6 高齢者（70歳以上）の食事摂取基準（文献16）

栄養素			男性 推定平均必要量	男性 推奨量	男性 目安量	男性 耐容上限量	男性 目標量	女性 推定平均必要量	女性 推奨量	女性 目安量	女性 耐容上限量	女性 目標量
蛋白質（g/日）			50	60	—	—	—	40	50	—	—	—
脂質	脂質（%エネルギー）		—	—	—	—	20以上25未満	—	—	—	—	20以上25未満
	飽和脂肪酸（%エネルギー）		—	—	—	—	4.5以上7.0未満	—	—	—	—	4.5以上7.0未満
	n-6系脂肪酸	（g/日）	—	—	8	—	—	—	—	7	—	—
		（%エネルギー）	—	—	—	—	10未満	—	—	—	—	10未満
	n-3系脂肪酸（g/日）		—	—	—	—	2.2以上	—	—	—	—	1.8以上
	コレステロール（mg/日）		—	—	—	—	750未満	—	—	—	—	600未満
炭水化物	炭水化物（%エネルギー）		—	—	—	—	50以上70未満	—	—	—	—	50以上70未満
	食物繊維（g/日）		—	—	—	—	19以上	—	—	—	—	17以上
ビタミン	脂溶性	ビタミンA（μgRE/日）	550	800	—	2700	—	450	650	—	2700	—
		ビタミンD（μg/日）	—	—	5.5	50	—	—	—	5.5	50	—
		ビタミンE（mg/日）	—	—	7.0	750	—	—	—	6.5	650	—
		ビタミンK（μg/日）	—	—	75	—	—	—	—	65	—	—
	水溶性	ビタミンB_1（mg/日）	1.0	1.2	—	—	—	0.8	0.9	—	—	—
		ビタミンB_2（mg/日）	1.1	1.3	—	—	—	0.9	1.0	—	—	—
		ナイアシン（mgNE/日）	11	13	—	300（75）[*1]	—	8	10	—	250（60）[*1]	—
		ビタミンB_6（mg/日）	1.1	1.4	—	50	—	1.0	1.1	—	40	—
		ビタミンB_{12}（μg/日）	2.0	2.4	—	—	—	2.0	2.4	—	—	—
		葉酸（μg/日）	200	240	—	1300[*2]	—	200	240	—	1300[*2]	—
		パントテン酸（mg/日）	—	—	6	—	—	—	—	5	—	—
		ビオチン（μg/日）	—	—	50	—	—	—	—	50	—	—
		ビタミンC（mg/日）	85	100	—	—	—	85	100	—	—	—
ミネラル	多量	ナトリウム（mg/日）	600	—	—	—	—	600	—	—	—	—
		（食塩相当量）（g/日）	1.5	—	—	—	9.0未満	1.5	—	—	—	7.5未満
		カリウム（mg/日）	—	—	2500	—	3000	—	—	2000	—	2900
		カルシウム（mg/日）	600	700	—	2300	—	500	600	—	2300	—
		マグネシウム（mg/日）	270	320	—	—	—	220	260	—	—	—
		リン（mg/日）	—	—	1000	3000	—	—	—	900	3000	—
	微量	鉄（mg/日）	6.0	7.0	—	50	—	5.0	6.0	—	40	—
		亜鉛（mg/日）	9	11	—	40	—	7	9	—	30	—
		銅（mg/日）	0.6	0.8	—	10	—	0.5	0.7	—	10	—
		マンガン（mg/日）	—	—	4.0	11	—	—	—	3.5	11	—
		ヨウ素（μg/日）	95	130	—	2200	—	95	130	—	2200	—
		セレン（μg/日）	25	30	—	260	—	20	25	—	210	—
		クロム（μg/日）	30	35	—	—	—	20	25	—	—	—
		モリブデン（μg/日）	20	25	—	550	—	20	20	—	450	—

[*1]：耐容上限量：ニコチンアミドのmg量，（ ）内はニコチン酸のmg量．
[*2]：サプリメントや強化食品から摂取する場合の許容上限量．

表7 70歳以上の性別・身体活動別食品構成(文献17)

食品群	乳・乳製品		卵		魚介・肉		豆・豆製品		野菜*		芋類		果物		穀類		砂糖		油脂	
身体活動レベル＼性別	男	女	男	女	男	女	男	女	男	女	男	女	男	女	男	女	男	女	男	女
身体活動レベルⅠ(低い)	250	250	50	50	100	80	80	80	350	350	100	100	200	200	240	160	10	5	15	15
身体活動レベルⅡ(ふつう)	250	250	50	50	100	80	80	80	350	350	100	100	200	200	320	210	10	10	20	15
身体活動レベルⅢ(高い)	250	250	50	50	100	100	100	100	350	350	100	100	200	200	380	280	10	10	25	20

数字は，1人1日あたりどれくらい摂取すればよいかの重量(g)を示す．
*野菜はきのこ類を含む．また，野菜の1/3以上は緑黄色野菜で摂ること．

何グラム摂取すればよいのかについて身体活動別に示されている．高齢者の場合には数字と簡単なイラストを示し，1日3食と間食でこれらの食品を上手く献立に取り入れられるように指導していくことが重要である．なお，この摂取基準値は日常活動の自立した高齢者を対象としたものであるため，体重および血糖コントロールの状況により微調整が必要である．

要介護状態の高齢糖尿病患者への食事療法

活動的な高齢者の場合は，成人と同様の食事療法を勧めることができるが，ADLが低下している高齢者の場合はさまざまな問題点が出てくる．

身体的な理由により買物に行けない独居の高齢者については，介護支援専門員との話し合いのもとで，食材・お弁当の宅配サービスまたは，介護保険の範囲内でヘルパーサービスを利用し，調理を依頼することを勧める．宅配サービス業界では，高齢者用やエネルギーコントロール用などの多種類を提供しているため，週に数回活用するとよい．

また，歯がない，義歯の不具合などの口腔内の問題がある場合には，摂取量低下による栄養不良[18]を避けるために歯科受診を勧める．一方，高齢者では，口腔内に問題がある場合や消化器疾患のため，主食を粥食にしている者が多く認められるが，在宅の要介護高齢者を対象としたコホート研究において，粥食を主食とする要介護高齢者の生命予後が普通食を主食とする者に比較して悪化することを報告している[19]．その理由としては，主食が普通の米飯の場合と粥食の場合では，確保できるエネルギー量，蛋白質量に差があり，主食が粥食の場合は1日の総エネルギー量と総蛋白質量が不足している可能性が高い．さらに主食を粥食にしていると，主菜，副菜ともにやわらかい食品に偏りがちで副菜の蛋白質の摂取量が少なくなる傾向にある．長期間主食を粥食に変更していく場合は，必ず補食などでエネルギーと蛋白質を補うようにするべきである．高齢者の場合，食事量や食事の回数を増やすことは困難な場合が多いため，摂食量を変更しない場合は専門家に相談し，高エネルギー・高蛋白質の栄養補助食品などの利用も考える．

認知機能の低下した糖尿病患者は，食事の管理はもちろん，血糖コントロールやインスリン注射の自己管理が難しい．家族介護者の存在や介護力，介護サービスの状況などを把握し，介護者の負担も考えた食事計画，食事指導法をとるべきである．

なお，要介護状態の高齢糖尿病患者の食事指導に関しては，介護者やヘルパーなどの調理を担当する者が管理栄養士による食事指導を受けることを進めたい．医療保険の場合は管理栄養士による「訪問栄養食事指導」であるが，介護保険の場合は「管理栄養士による居宅療養管理指導」サービスがあり，主治医の指示のもと，月2回の算定が可能である．各家庭の経済状況，介護環境，口腔の状態など，個々の状況に合わせたバランスのとれた栄養摂取の方法が示される．

おわりに

高齢者糖尿病の発症頻度は年々増加しているが，その治療上，身体・精神機能低下に伴うさまざまな問題がある．高齢者は成人に比べて身体活動能力の個人差が大きいため，スクリーニングとして栄養評価と高齢者機能評価を行うことは必須であり，これらは食事療法の方法を検討するために非常に重要である．そして，個々の患者を客観的に評価し，患者個々の機能や環境に見合った，そして高齢者唯一の「楽しみとしての食事」となるような食事療法の方法を，患者と家族とともに考えていかなければならない．

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Burden reduction of caregivers for users of care services provided by the public long-term care insurance system in Japan

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ABSTRACT

We surveyed the care burden of family caregivers, their satisfaction with the services, and whether their care burden was reduced by the introduction of the LTCI care services. We randomly enrolled 3000 of 43,250 residents of Nagoya City aged 65 and over who had been certified as requiring long-term care and who used at least one type of service provided by the public LTCI; 1835 (61.2%) subjects returned the survey. A total of 1015 subjects for whom complete sets of data were available were employed for statistical analysis. Analysis of variance for the continuous variables and χ^2 analysis for that categorical variance were performed. Multiple logistic analysis was performed with the factors with p values of <0.2 in the χ^2 analysis of burden reduction. A total of 68.8% of the caregivers indicated that the care burden was reduced by the introduction of the LTCI care services, and 86.8% of the caregivers were satisfied with the LTCI care services. A lower age of caregivers, a more advanced need classification level, and more satisfaction with the services were independently associated with a reduction of the care burden. In Japanese LTCI, the overall satisfaction of the caregivers appears to be relatively high and is associated with the reduction of the care burden.

1. Introduction

The public long-term care insurance (LTCI) system was introduced in 2000 to meet the increasing need for elder care in the rapidly aging society of Japan (Tamiya et al., 2011). LTCI provides services according to care levels 1–5 and support levels 1 and 2 (Ozawa & Nakayama, 2005; Tsutsui & Muramatsu, 2007). The individuals who need continuous care are classified into one of the care levels 1–5 according to their mental or physical disabilities, whereas those who need support for daily activities but do not need care are classified as support level 1 or 2.

The purpose of LTCI is to maintain the dignity and independent daily life routines of elderly individuals who need support. The socialization of elderly care through institutional and community-based LTC services was promoted under the slogan "from care by family to care by society." The introduction of LTCI was intended to relieve the burden of care on family members. It has been reported that usage of LTCI care services successfully relieves the burden on family caregivers (Kumamoto, Arai, & Zarit, 2006; Nakagawa & Nasu, 2011). One study showed that a heavier care burden was associated with patient mortality and hospitalization (Kuzuya et al., 2011), and another study demonstrated that alleviation of the caregivers' burden is essential to prevent institutionalization (Oyama et al., 2012). The factors associated with the reduction of the care burden by the introduction of care services by LTCI have not been fully investigated.

A study from the USA reported that the claimants of LTCI provided by a private insurance company had high levels of satisfaction (Cohen, Miller, & Weinrobe, 2001). The degree of satisfaction may reflect the appropriateness of the services provided. An investigation of satisfaction with the services provided by public LTCI in Japan is warranted.

We surveyed family caregivers of the recipients who actively use LTCI care services in Japan and asked about their care burden, their satisfaction with the services and whether their care burden was reduced by the introduction of the LTCI care services. The primary purpose of this study was to investigate the factors associated with reduction of the care burden by LTCI care services.

2. Methods

This study was carried out in Nagoya City, in central Japan. Nagoya City has a population of 2,261,377 (April 2010), of whom

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21.4% were 65 years of age or older. This study was developed and organized by Nagoya City and was supported by the Department of Community Healthcare & Geriatrics of the Nagoya University Graduate School of Medicine. Written informed consent was obtained from all the participants. The city office randomly enrolled 3000 residents of Nagoya City aged 65 and over who had been certified as requiring long-term care and who used at least one type of service provided by the public LTCI in April of 2010, according to the LTCI database of the city (43,250 subjects). A questionnaire was sent to their principal caregivers by mail, and 1835 (61.2%) subjects returned the survey. The investigators obtained the anonymous data from the city office. In this study, the data of 1015 subjects for whom complete sets of data were available were used for the statistical analysis. The questionnaire for the caregivers included the Zarit Burden Scale short version (Zarit-8) (Kumamoto & Arai, 2004) and the following additional questions: (1) Are you satisfied with the services provided by LTCI? (satisfied, somewhat satisfied, somewhat dissatisfied, dissatisfied); and (2) Has the service reduced your care burdens? (reduced greatly, reduced, have not changed, increased, increased greatly). Analysis of variance for the continuous variables and χ^2 analysis for the categorical variance were performed. In the analysis of variance for the continuous variables and the χ^2 analysis, the two additional items were each divided into two categories: satisfied (satisfied and somewhat satisfied) vs. dissatisfied (somewhat dissatisfied and dissatisfied) and reduced (reduced greatly, reduced) vs. not reduced (not changed, increased, increased greatly). Multiple logistic analysis of the factors with p values of <0.2 in the χ^2 analysis of the burden reduction was performed.

3. Results

The results regarding the care burden are shown in Table 1. The caregivers of male care recipients bear a heavier burden than caregivers of female recipients, and female caregivers had higher Zarit-8 scores than males. With respect to the duration of care, longer care was associated with a greater burden. Caregivers of single individuals reported a lighter burden.

We found clear differences in the caregivers' burdens between the support and care levels, with the care burden for care levels 1–5 being significantly higher than that for the support levels 1–2. No significant differences were found within either of the groups by the post-hoc analysis.

Of the caregivers, 28.5% (289 of 1015) were satisfied with the services provided by the insurance, and 58.3% (592) were somewhat satisfied. Only 10.7% (109) and 2.5% (25) were dissatisfied or somewhat dissatisfied with the services, respectively. The degree of satisfaction with the care services was associated with the scores on the Zarit burden scale 8 (Table 1).

The majority of the caregivers indicated that their burden was greatly reduced (n = 98, 9.7%) or reduced (n = 600, 59.1%) as a result of the LTCI services. The burden did not change for 27.9% (n = 283) of the caregivers, whereas 2.5% (25) considered their burden to have increased after the introduction of the LTCI services, and 0.9% (9) thought their burden had increased greatly. The rates of caregivers by type who felt their care burden was reduced (reduced or greatly reduced) are shown in Table 2. Several caregiver groups showed tendencies to feel a reduced burden including the caregivers of older recipients, younger caregivers, and caregivers of patients with more advanced need classifications. Greater satisfaction with the care services was associated with reduction of the burden.

To further investigate the factors associated with reduction of the care burden, a multiple logistic analysis with the factors having p values <0.2 in Table 2 was performed. The analysis showed that the younger age of caregivers, the more advanced levels of need classification, and greater satisfaction with the services provided were independently associated with reduction of the care burden (Table 3). Sixteen types of services were available through LTCI, and adjustment for the number of the types of services used did not change these results.

Table 1
Subjects' characteristics and Zarit Burden Score-8.

		Zarit Burden Score-8	p value
Number	1015		
Number of types of services used (1–16)	2.9 ± 1.8		
Zarit-8 (0–32)		10.8 ± 8.5	
	% in each category		
Age of care recipients			0.074
65–69	6.8	9.8 ± 7.3	
70–74	12.3	12.7 ± 8.9	
75–79	19.8	10.7 ± 8.9	
80–84	17.8	10.0 ± 8.3	
85–89	20.2	10.5 ± 8.7	
90+	23.0	11.3 ± 8.3	
Gender of care recipients			0.043
Male	35.8	11.6 ± 8.5	
Female	64.2	10.5 ± 8.5	
Classification level			<0.001
Support level 1	9.2	6.1 ± 7.4	
Support level 2	10.9	7.3 ± 7.4	
Care need level 1	13.9	11.6 ± 8.6	
Care need level 2	14.4	11.2 ± 8.4	
Care need level 3	18.5	13.2 ± 8.8	
Care need level 4	16.3	11.7 ± 8.3	
Care need level 5	16.6	11.3 ± 8.1	
Age of caregivers			0.418
Under 40	2.0	12.0 ± 9.7	
40–64	45.8	10.5 ± 8.2	
65–74	27.6	11.4 ± 8.4	
75+	24.6	11.2 ± 8.9	
Gender of caregivers			<0.001
Male	30.6	9.3 ± 8.3	
Female	69.4	11.6 ± 8.5	
Family structure of care recipients			0.001
Single	8.4	6.3 ± 7.7	
Couple	29.8	10.8 ± 9.0	
With children	58.6	11.3 ± 8.2	
Other	3.2	12.9 ± 7.3	
Relationship			0.052
Spouse	39.4	11.5 ± 8.8	
Child	36.7	10.1 ± 8.1	
Child-in-law	17.6	12.0 ± 8.3	
Other	6.3	11.2 ± 8.9	
Duration of care			0.011
Less than 1 year	7.4	8.8 ± 8.2	
1–3 years	31.1	9.9 ± 8.1	
3–5 years	22.3	11.6 ± 8.7	
5–10 years	27.3	11.4 ± 8.5	
More than 10 years	11.5	12.1 ± 9.2	
Satisfaction with care services			<0.001
Satisfied	28.5	8.8 ± 7.7	
Somewhat satisfied	58.3	11.0 ± 8.4	
Somewhat dissatisfied	10.7	14.3 ± 9.0	
Dissatisfied	2.5	15.3 ± 10.8	

p value by one-way analysis of variance.
Zarit burden scale 8 scores are shown as mean ± SD.

4. Discussion

In this study almost 70% of the caregivers of the care recipients who used the care services provided by LTCI felt a reduction of the care burden by the introduction of the services. Satisfaction with the services provided by LTCI, a younger age of caregivers, and more advanced care need certification were significantly associated with the reduction of the care burden resulting from the introduction of public LTCI care services.

Table 2
Percent of the subjects whose care burden was reduced.

	Care burden reduced, % (number)	p value
Number	68.8 (698)	
Age of care recipients		0.133
65–69	75.4 (52)	
70–74	62.4 (78)	
75–79	64.8 (118)	
80–84	66.7 (134)	
85–89	70.2 (144)	
90+	73.8 (172)	
Gender of care recipients		0.477
Male	68.4 (245)	
Female	69.1 (444)	
Classification level		0.127
Support level 1	58.1 (54)	
Support level 2 (%)	66.4 (73)	
Care need level 1 (%)	70.0 (98)	
Care need level 2 (%)	68.3 (99)	
Care need level 3 (%)	66.1 (123)	
Care need level 4 (%)	72.6 (119)	
Care need level 5 (%)	74.9 (125)	
Age of caregivers		0.133
Under 40 (*n*)	75.0 (15)	
40–64 (*n*)	71.1 (322)	
65–74 (*n*)	70.0 (191)	
75+ (*n*)	63.8 (155)	
Gender of caregivers		0.408
Male (*n*)	68.3 (207)	
Female (*n*)	69.3 (476)	
Family structure of care recipients		0.809
Single (%)	71.4 (60)	
Couple (%)	66.9 (200)	
With children (%)	59.2 (407)	
Other (%)	71.9 (23)	
Relationship		0.812
Spouse (%)	68.3 (259)	
Child (%)	69.4 (245)	
Child-in-law (%)	72.2 (122)	
Other (%)	67.2 (41)	
Duration of care		0.750
Less than 1 year (%)	63.0 (46)	
1–3 years (%)	68.8 (212)	
3–5 years (%)	70.5 (158)	
5–10 years (%)	69.3 (187)	
More than 10 years (%)	65.8 (75)	
Satisfaction with care services		<0.001
Satisfied (%)	78.2 (226)	
Somewhat satisfied (%)	68.4 (405)	
Somewhat dissatisfied (%)	55.0 (60)	
Dissatisfied (%)	28.0 (7)	

p values by χ^2 analysis were shown.

Previous studies reported that respite services including home help, day care, and residential respite (short stay service) were associated with alleviation of the care burden (Desrosiers et al., 2004; Garcés, Carretero, Ródenas, & Alemán, 2010; Hawranik & Strain, 2000; Hoskins, Coleman, & McNeely, 2005; Shaw et al., 2009; Theis, Moss, & Pearson, 1994; Warren, Kerr, Smith, & Schalm, 2003; Zarit, Gaugler, & Jarrot, 1999; Zarit, 1996, 2002). The reduction of the care burden reported by caregivers in the current survey may be because of the respite services provided by LTCI. The content of the services associated with alleviation of the care burden should be investigated further.

This survey shows that the overall satisfaction of the caregivers of individuals using LTCI services in Japan is relatively high (86.8% of the caregivers were satisfied or somewhat satisfied). According to a report from the USA, the LTCI provided by private insurance companies satisfied approximately two-thirds of the claimants (Cohen et al., 2001), and the current results suggested a comparable satisfaction rate for the Japanese public LTCI. The introduction of care services by public LTCI seemed to contribute to a reduction in the care burden, as previously reported (Kumamoto et al., 2006). The report from the USA showed that 72% of the claimants felt stress was reduced by the introduction of the services (Cohen et al., 2001), a figure that was comparable to the rate of this survey (68.8%). More satisfaction with the care services was associated with the reduction of care burden in the current study. Although the current cross-sectional survey did not elucidate the causal relationship, the provision of services that matched the needs of the care recipients and caregivers would lead to the reduction of the care burden and satisfaction with the program. The detailed assessment of the needs of care recipients and caregivers and providing appropriate services would be critical for the burden reduction of the caregivers. The caregivers of recipients with more advanced care need certifications tended to feel that their burden had been reduced by the introduction of the care services. It is very relevant for many countries with increasing elderly population that public LTCI system could reduce care burden of the caregivers of more advanced care needs. In Japanese LTCI care recipients with more advanced care need certifications are afforded more services. Greater frequency and intensity of care services have been associated with the perception of reduced care burden (Garcés, Carretero, Ródenas, & Sanjosé, 2009). In the current study adjustment by the number of different types of care services used did not change the association of the need classification with the reduction of care burden in the multiple logistic analysis. We only surveyed the number of the types of the services. This survey may not be a good index of the intensity of the service, such that adjustment with this index alone may not have been sufficient.

Younger caregivers tended to perceive a reduction in the care burden by the introduction of care services by LTCI. This perception may be because younger caregivers require more time for personal business, and the introduction of the services allowed them that freedom, which may have led to a reduced burden. If so, the LTCI system could provide chances for the younger caregivers to participate in social activities, which may be a relevant message for the countries with increasing elder populations.

Whereas nearly 70% of the caregivers considered their care burden to have been reduced, the burden of some caregivers was found to have increased. The reasons remain unclear, but might include the psychological distress of the presence of home-helpers, the financial costs and time expenditures resulting from the services could be associated with an increased care burden. The reasons for this increase should be investigated. The rates of satisfaction with the care services provided by LTCI were relatively high, but the factors associated with dissatisfaction with the services should be explored. In Japan "care managers" make "care

Table 3
Multiple logistic analysis for the reduction of care burden.

	B	Odds ratio	95% CI	*p* value
Age of care recipients	0.041	1.042	0.952–1.141	0.371
Age of caregiver	−0.178	0.837	0.709–0.987	0.034
Certified level	0.134	1.143	1.060–1.232	<0.001
Satisfaction with public LTCI (1: dissatisfied greatly; 4: satisfied greatly)	0.688	1.990	1.615–2.452	<0.001

plans" for each care recipient, based on the certification. A system of assessing the care planning would be warranted to reduce the number of dissatisfied and/or heavily burdened caregivers.

In this study, female caregivers reported heavier burdens than male caregivers, which is consistent with a report from Finland (Pöysti et al., 2012). Another study found that female caregivers reported lighter burdens than male caregivers (Rosdinom, Zarina, Zanariah, Marhani, & Suzaily, 2013). Gender differences in care burdens may be subject to cultural, social, and biological factors. In this study, the caregivers of male recipients reported a heavier burden. The reasons for the association were unclear, but the physical burden of providing care for male recipients (e.g., moving them) may be greater.

We found a relationship between the Zarit-8 scores and the duration of care. A longer duration of care appears to exhaust caregivers. This finding agreed with a report by Limpawattana, Theeranut, Chindaprasirt, Sawanyawisuth, and Pimporm (2013). Single persons living alone appeared to have relatively preserved function and had lower need classifications (44% of them were at the support levels). The lower burden of their caregivers was most likely caused by the overall lighter burden of their care.

In this survey, the burden reported by caregivers of elderly individuals classified at any of the "care" levels 1–5 was significantly higher than that reported by caregivers of those classified at the support levels 1–2. This finding suggests that the stratification of support and care levels in the Japanese LTCI system is reasonable. Among the "care" levels 1–5, we found no significant differences in terms of the care burden. In the current analysis, the more advanced care levels were associated with care burden reduction. The current cross-sectional analysis did not reveal whether the care burden reduction resulting from the introduction of LTCI services led to the homogenous care burden among each "care" level. A prospective study would be warranted for further clarification.

The major limitation of this study is its cross-sectional design. It is unclear whether the reduced burden reported by satisfied caregivers was caused by their satisfaction or whether the reduction in the care burden induced by the introduction of the LTCI services led to the satisfaction of the caregivers. The caregivers who indicated a reduction in the care burden had lower Zarit-8 scores, but it is not clear that these lower scores were caused by the introduction of the care services. A prospective survey to investigate the changes in the burden scale scores before and after the introduction of the care services would provide more information regarding the association between LTCI and the care burden. The second limitation of the study was the response rate. We analyzed 34% of the randomly selected samples. The non-responders or incomplete responders may have had less satisfaction or greater care burden levels, and caution in the interpretation of this study is warranted.

This study was performed on a relatively large sample of randomly selected cases of elder care services provided by LTCI in an urban area in Japan. We hypothesize that the sample well represents the local characteristics, but it is not clear whether it is applicable to other areas including rural areas of Japan. In this analysis, the subjects with incomplete data sets were excluded. The age, gender, and certified care levels were not significantly different between the included and excluded subjects; the excluded subjects primarily lacked data from the Zarit burden scale. Careful interpretation of the current results is warranted.

The rate of satisfaction with the care services provided by LTCI in Japan was relatively high, and the degree of satisfaction was associated with the reduction of the care burden.

Conflict of interest

None declared.

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